about failed CC). This leads to a simplified reporting, even though there may be some restrictions for the precoder. Therefore, this option should be used advantageously only for very low number of failed CCs.

Reporting Option d)

[0136] Report only for scheduled CoMP UEs on those PRBs known to be scheduled from predictive scheduling.

Reporting Option e)

[0137] Quite different would be an analogue feedback, i.e. providing for each of the 36 WB beams and 100 PRBs one single resource—i.e. overall 36*100=3600 resource elements will be occupied—, where all active UEs will send with a certain UL power on the corresponding resource element, depending on the prediction error. The eNB can than estimate and detect from the superposition of all UEs those CCs and PRBs having no to very small prediction errors for all active UEs. Assuming LTE numerology the feedback overhead would be less than 5% and might be further optimized to e.g. 1%.

[0138] In the following it is described, how JT CoMP is adapted to error free channel components in opportunistic way according to embodiments of the present invention.

[0139] Based on the fast feedback about failed channel components the eNBs can decide about the best precoder adaptation. The idea is to keep JT CoMP only for those channel components where CSI prediction quality is sufficiently high. That is the reason why the solution according to embodiments of the present invention is called opportunistic or OP CoMP. It makes the best of the available CSI knowledge, given e.g. by a matrix similar to that as show in FIG. **5**.

[0140] FIG. **5** illustrates a norm of error between predicted and real CSI for 36 UEs at one site with 3 cells and 4 antennas per cell.

[0141] In the following, precoder adaptation is described. In case the eNB decides to keep the cooperation area as it is, it will have to adapt its precoder weights similar as illustrated in FIGS. **6**, **7**, **8** and **9**.

[0142] FIG. **6** illustrates a basic cooperation area of one site with 3 cells and 4 antenna elements per cell serving e.g. 9 UEs. Thus, in this example 12 WB beams **1** . . . **12** are present which are indicated by circles. The channel component $h_{n,m}$ (which is indicated by a solid circle) is assumed to be errored. FIG. **7** illustrates the effect of one single errored channel component (indicated by an X in the matrix H) on the Rx matrix Y. FIG. **8** illustrates a simulation of the effect of one single errored channel component on the Rx matrix Y. In particular, in the blank components, no problem occurs, whereas the influence of the error is considerable on the diagonal components. The influence is indicated by different dots in the corresponding boxes. The horizontally hatched elements indicate intra cooperation interference terms for the UE **3**.

[0143] FIG. **9** illustrates a strategy II for precoder adaptation (W to W**2**), i.e. skip row m of H. This means that wideband beam number m is not used at all for precoder W**2**.

[0144] That is, in a first option the eNB has to reduce the powers of all weights for all UEs having a strong precoding weight plus a low pathloss for the errored channel component. That way the maximum error is limited, but it might affect all UEs by corresponding lower SINRs or respectively lower modulation and coding schemes.

[0145] The alternative is to set the power for the corresponding channel component to zero for all UEs meaning that the rank of the overall channel from all eNBs to all simultaneously served UEs is reduced by one. In case of one or very few errored CCs the diversity order might be only slightly reduced so that the precoding normalization loss is as well only slightly increased.

[0146] Depending on the data rate loss for each option a weighted combination of both schemes is possible. Scheduling is vendor specific and UEs might be unaware of this precoder adaptation. So, in connection with some embodiments of the present invention as described above, only the reporting of failed CCs as introduced above is relevant.

[0147] In the following, an embodiment is described according to which CA size is adaptively shrinked, namely an alternative way of increasing robustness by splitting the large cooperation area (e.g. 27 UEs×36 WB beams) into smaller sub-cooperation areas of smaller size leading to a block diagonal channel matrix H_{block} as well as precoding matrix W_{block}. That way per sub cooperation area the number of relevant CCs is reduced and accordingly the sensitivity to corresponding precoding errors of CCs.

[0148] A corresponding MATLB system level simulation applying the IMF-A framework for the large CA achieved a spectral efficiency of SE=7.07 bit/s/Hz/cell, being more than a factor of two larger than what is possible with LTE Advanced MU MIMO (about 3 bit/s/Hz/cell). Adding channel prediction errors to 1% of randomly selected CCs reduced the spectral efficiency to 4.1 bit/s/Hz/cell. By reducing the CA size to intra site cooperation i.e. to 3 CA a size 9×12 the spectral efficiency could be recovered to 5.93 bit/s/Hz/cell.

[0149] Here the idea of opportunistic CoMP (OP CoMP) is to use the largest possible size of the cooperation area whenever possible in an opportunistic way, i.e. depending on the quality of the available channel knowledge. In case there are no CSI errors (known from the fast feedback channel as defined above), the eNB will do precoding for the large CA resulting in the highest possible spectral efficiency. In case of some failed CCs the precoder might be adapted to some extent. In case the number of failed CCs is getting to large (few percent of all CCs) the size of the CAs will be shrinked step wise to increase robustness and performance.

[0150] Alternatively or in addition to the shrinking of the CA size the scheduling of simultaneously served users might be adapted compared to the original scheduling under the assumption of full channel knowledge. The idea is that by shrinking the cooperation size there will be remaining inter cooperation interference between these small cooperation areas. By coordinated scheduling or coordinated beamforming over the set of small CAs the most interfering CCs might be used with reduced power or even switched off. In case one or few of the CCs interfere with several UEs switching off this CC might benefit many UEs and might significantly increase the overall spectral efficiency.

[0151] Alternatively or in addition the UEs with more than one Rx antenna might adapt their interference rejection receiver (IRC) processing to cancel such strong inter CA interferers. Adaptation is required, as in case of the large CA the CA wide precoder will minimize this interfering CC so that the IRC can be used e.g. to cancel other next strongest interferers.